COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

FINAL APPROVAL OF November 14, 2002 REVISION

FIELD OPERATIONS MANUAL FOR AIR INSPECTORS
Air Standard Operating Procedures (ASOPs)

ASOP-10: REVIEW OF CEM REPORTS

Per Collaboration Process Development Memo Dated July 20, 2000

- Revision coordinated by Manager, Office of Air Compliance Coordination
- Reviewed by regional Air Compliance Managers and designees
- Presented to Senior Management Team for review and comment
- Finalized by Manager, Office of Air Compliance Coordination

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ASOP - 10
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I. INTRODUCTION AND PURPOSE

Some sources are required by regulation, permit, or order to demonstrate continuous compliance with emission standards, permit limits, control device or percent removal efficiencies, and/or acceptable operation and maintenance (O&M) practices. Often a source will demonstrate continuous compliance through the installation, maintenance and operation of a Continuous Emission Monitor (CEM).

Facilities with a CEM are required to submit CEM Reports[1] to the Department on a pre-determined schedule (e.g. quarterly or semi-annually). The content of CEM Reports is stipulated by state and federal regulations. Acceptable reporting elements are detailed within this guidance document. Sample checklists and report formats are attached as appendices to this document to assist the inspector and facility personnel.

Once an inspector has scanned the data and determined it to be complete, a thorough technical review is conducted. The inspector has up to 30 days from receipt of the CEM Report to complete his or her evaluation and write up an inspection report in CEDS indicating compliance status. A summary of the information should be forwarded to the DEQ Central Office Air Compliance Section for entry into the national EPA database.

II. REFERENCES

A. State Air Pollution Control Board Regulations for the Control and Abatement of Air Pollution, 9 VAC 5-40-40 through 9 VAC 5-40-41 describes the existing source monitoring requirements.
B. State Air Pollution Control Board Regulations for the Control and Abatement of Air Pollution, 9 VAC 5-50-40 and 9 VAC 5-50-50, describes the new and modified source monitoring requirements.
C. 40 CFR 60 APPENDIX B and 40 CFR 75 – Performance Specifications.
D. 40 CFR 60 APPENDIX F – Quality Assurance Procedures.
E. Handbook for the Review of Excessive Emission Reports - EPA-340/1/86--011 - May 1986.
F. Continuous Emission Monitoring - written by James A. Jahnke, Ph.D. - Copyright 2000 (second edition).

III. DEFINITIONS

For purposes of this guidance, the following words or terms have the meaning stated:

CALIBRATION DRIFT – the difference in the CEMS output reading from a reference value after a period of operation during which no unscheduled maintenance, repair or adjustment took place.

CALIBRATION/QA - refers to any period during which the monitoring system is out-of-service for purpose of calibration, routine or preventive maintenance, or other quality assurance related activity.

CEDS - DEQ's Comprehensive Environmental Data System

[1] The two reports required by 40 CFR 60.7 are the Excess Emission Report and the Summary Report. If a CEM is considered to be a Direct Compliance Monitor then an Emissions Data summary or report is required in addition to the other reporting elements

CGA- Cylinder Gas Audit

CONTINUOUS EMISSION MONITOR (CEM) - a device used to continuously measure pollutants in exhaust gases from combustion or industrial processes.

CONTINUOUS MONITORING SYSTEM (CMS) or CONTINUOUS EMISSION MONITORING SYSTEM (CEMS) - a comprehensive term that may include, but is not limited to, continuous emission monitoring systems, continuous opacity monitoring systems, continuous parameter monitoring systems, or other manual or automatic monitoring that is used for demonstrating compliance with an applicable regulation on a continuous basis.

CONTINUOUS OPACITY MONITORING SYSTEM (COMS) – Equipment used to measure the opacity of an exhaust stream on a continuous basis.

CEM REPORT – A report submitted to the Department by the Source on a pre-determined frequency (e.g. quarterly) which provides data on a Source's compliance with stated emission limits and operating parameters, and on the performance of the monitoring system. The applicable regulation or permit indicates what data must be contained in these reports.

CEM SYSTEM - The TOTAL equipment required for the determination and recording of opacity, or a gas concentration or emission rate.

DIRECT COMPLIANCE CEMS - a monitoring system that is specified by regulation, permit or Board order as an official continuous compliance determinant method.

EMISSIONS DATA - as specified in some permits and regulations, the portion of the CEM Report that provides CEM results for the entire reporting period, not just "excess" emissions.

EXCESS EMISSION REPORT (EER*)* – Same as CEM REPORT above. The term EER historically referred to reports for Indirect Compliance Monitor data or opacity data.

EXTRACTIVE SYSTEMS -Extractive CEM systems remove gas from the stack or duct, filter out particulate matter, and transport the gas to a CEM shelter or trailer for analysis

INDIRECT COMPLIANCE CEMS - a monitoring system that is not an official compliance determinant method specified by regulation, permit or Board order. These systems are required by regulation, permit or Board order to track occurrences of excess emissions for the purpose of identifying potential problems associated with O&M practices. Results from these monitors can be used as Credible Evidence of noncompliance (see DEQ's Enforcement Manual).

IN-SITU SYSTEMS -In-situ CEMs measure emissions directly in the stack.

MAGNITUDE OF EXCESS EMISSIONS – are computed in accordance with 40 CFR 60.13(h), indicating the highest (or worse case) value recorded during an emissions incident.

NON-MONITOR EQUIPMENT MALFUNCTION - refers to failures or problems with any equipment other than the monitoring equipment that is necessary to transfer, compute averages, and record emissions data. These malfunctions can include failure of a strip chart recorder, or data losses resulting from problems with a computer data acquisition system. .

NSPS- refers to New Source Performance Standards found in 40 CFR 60.

OUT OF CONTROL PERIOD - A time period in which monitoring data is determined to be "invalid". This occurs whenever a monitor's daily calibration drift exceeds the applicable performance specification in 40 CFR 60, Appendix B or as specified in the applicable subpart.

RAA- Relative Accuracy Audit

RATA- Relative Accuracy Test Audit

REPORTING IN PERIODS OF THE APPLICABLE STANDARDS – CEMS which measure opacity shall reduce all data to 6-minute averages and CEMS, which measure gas, shall reduce all data to 1-hour averages for time periods as defined in 40CFR60 §60.2.

REPORTING OF MALFUNCTION INFORMATION - periods of excess emissions, which occur during a malfunction of process or control equipment, which occur for more than one hour. Each malfunction must be separately identified.

SST or SIGNIFICANT THRESHOLD LIMIT -For some EPA HPV Matrix Criteria there are also supplemental significant threshold ("SST") standards, which are lb/hr emission rates triggering PSD review. In those cases, the violation is an HPV if the emissions underlying the violation exceed the SST for that pollutant OR the exceedance is over a certain percentage. The SSTs are listed below:

Pollutant	Supplemental Significant Threshold (SST)
CO	23 lb/hr
NO_x	9 lb/hr
SO_2	9 lb/hr
VOC	9 lb/hr
PM	6 lb/hr
PM10	3 lb/hr

STARTUP/SHUTDOWN - as defined in 40 CFR Section 60.2 means "the setting in operation of an affected facility for any purpose" and "the cessation of operation of an affected facility for any purpose".

SUDDEN UNFORESEEABLE MALFUNCTION, or MALFUNCTION OF CEM - any period during which a monitor is not operating or is producing inaccurate data due to a sudden unforeseeable failure of any CEMS component.

VALID DATA - data that has been calculated and expressed in units of the applicable standard, has been quality assured, and is produced by a certified CEM.

IV. CONTINUOUS EMISSION MONITORING SYSTEMS

CEMS are application dependent. For regulatory purposes, they may be direct or indirect compliance monitoring systems. Continuous emission monitoring techniques vary according to pollutant, location, operating conditions at the plant, gas stream variables, and expected concentrations. A brief overview is provided below.

A. REGULATORY TYPES OF MONITORS

1. Direct Compliance Monitors

Direct compliance monitors are those that are used to directly measure source emissions in relation to an emission standard or permit limit. As long as the CEM is certified and up to date on calibrations and audits, whatever that CEM reads is what the emissions are. If the CEM shows emissions in excess of the standard, then there is direct evidence of a violation. Indirect compliance monitors, on the other hand, *indicate* that there may be a violation; only the emissions measured during a follow-up stack test, using approved EPA Reference Methods, would be considered to be the source's actual emissions on which compliance is based.

Examples of direct compliance monitors are Sulfur Dioxide (SO_2) and Nitrogen Oxide (NO_x) CEMS as specified in the New Source Performance Standards (NSPS) Subparts Da and Db. Another more current application of direct compliance monitors are those used to measure SO_2 and NOx emissions by mass (in lb/hr) for the Acid Rain and NOx Trading Programs. Each ton of emissions measured by the CEM equals one allowance that can be traded on the market. (See ASOP-11 for details on the NOx Trading Program).

Direct compliance monitors have specific quality assurance procedures and use certified reference gases traceable to the National Institute of Standards and Technology (NIST) for audits. These audits are required to be performed periodically to ensure the accuracy of the data generated by the monitoring system.

2. Indirect Compliance Monitors

Indirect compliance monitors are used to *indicate* compliance in relation to an established emission limit. For these facilities the permit or regulation states that some other method,

such as visible emissions evaluations or a temperature gauge on a control device, will be used to determine whether the source is in or out of compliance.

Historically, CEMs were not as reliable and accurate as they are today. They were initially used as tools for plant operators to provide early indications that stack emissions were nearing unacceptable levels and to make operational adjustments in the control room. The age of the facility's emission unit and/or its permit is a clue in helping the inspector determine whether or not the CEM is indirect or direct. The older the requirement, the more likely that the CEM is compliance-indicative (indirect) rather than compliance-determinative.

Opacity monitors are usually indirect compliance monitors because they do not directly measure particulate matter, which is the regulated pollutant. Instead they measure the scattering of a light beam as it travels from one end of the stack to the other. The degree of opaqueness of the stack gas is assumed to be mathematically proportional to particulate emissions. Actual particulate emissions, however, are measured using EPA Reference Method 5, or equivalent.

Indirect compliance monitors may not have specific quality assurance procedures and therefore the data may not provide the same accuracy or integrity as direct compliance monitors. The information gathered by these monitors is used for identifying emission incidents or CEM incidents indicating possible O&M deficiencies and/or malfunctions. Examples of indirect compliance monitors include opacity COMS, SO_2 and NOx CEMS specified by NSPS Subpart D and the TRS monitors specified by NSPS Subpart BB. NOTE: CEM data, even from indirect compliance monitors, can be used as Credible Evidence of noncompliance (see DEQ's Enforcement Manual).

3. Combination Type Compliance Monitors

An example of a combination-type CEM system would be SO_2 monitors located at the inlet and outlet of an SO_2 scrubber control device. In this situation the difference between the two monitors is used to certify the control system efficiency. The monitoring system (both the inlet and outlet CEMs) is the direct compliance method for determining the control efficiency of the scrubber. However, the inlet monitor by itself is an indirect compliance monitor used to indicate the uncontrolled SO_2 emissions entering the control device, for which there is no emission standard. The outlet monitor directly measures the SO_2 emissions emitted to the atmosphere. The facility's permit probably specifies both a scrubber control efficiency requirement as well as an outlet SO_2 emission limit.

B. CEM SYSTEM TYPES

1. Extractive Systems

Extractive CEM systems remove gas from the stack or duct, filter out particulate matter, and transport the gas to a CEM shelter or trailer for analysis (Jahnke, p. 44). The stack gas either remains hot through a heated sample line as it is transported to the shelter, or goes through a conditioning system to cool and condense out the moisture. A conditioning system can be located directly at the base of the probe, or farther away at the shelter.

Analytical methods used in extractive system gas analyzers include the following:

a. Absorption Spectroscopic Methods (infrared and ultraviolet)
b. Luminescence Methods (fluorescence and chemiluminescence)
c. Electroanalytical Methods (polarography, electrocatalysis, paramagnetism, and calorimetry)
d. Hazardous Air Pollutant (HAPS) Methods (absorption spectroscopy, gas

chromatography, ion-mobility spectrometry, and atomic emission spectroscopy)

To learn more about extractive systems, see Chapter 3 of Dr. Jahnke's book referenced in Section II.

2. In-Situ Systems

In-situ CEMs measure emissions directly in the stack. In-situ systems do not require conditioning of the flue gas composition and are designed to detect gas concentrations in the presence of particulate matter. They have fewer subsystems and are designed to withstand the high temperatures and vibrations associated with stack conditions. There are two basic types of in-situ CEMs:

a. point (in-stack or short path) monitors
b. path monitors

Point monitors measure at a single point in the stack. Path monitors measure over a distance across the stack or duct using electro-optical techniques. Light is transmitted through the stack gas to a detector on the opposite end, or reflected back to the transmitting location and detected there. To learn more about in-situ systems, see Chapter 6 of Dr. Jahnke's book.

3. Opacity Monitors

Opacity refers to the amount of light measured at the detector from a light beam transmitted across a stack or duct. Opacity monitors are often called "transmissometers" because they involve transmitting light from one end of the stack to a detector at the other. The detectors are optimized to provide a signal that correlates to the particulate mass concentration in the stack gas. To learn more about opacity monitors and the principles of electronic and spectral response, wavelengths, pathlength correlations, etc., see Chapter 8 or Dr. Jahnke's book.

4. Flow Rate Monitors

Flow rate monitors are used to measure stack gas velocity for the purpose of determining mass emission rates of criteria pollutants. They became widely used for compliance with the Acid Rain program, and more recently the NOx Trading Program. Flow rate monitoring techniques include:

a. differential pressure sensing (pitot or averaging tubes)
b. thermal sensing (heated sensors)
c. acoustic velocimetry (ultrasonic transducers or audible sensors)
d. time of flight (infrared sensors)
e. engineering/heat rate (fuel flow meters)

To learn more about flow rate CEMs, see Chapter 7 of Dr. Jahnke's book.

V. REPORTING REQUIREMENTS

Many sources submit data for more than one monitoring system in a single quarterly or semi-annual submittal[2]. The data submitted for each CEM, however, is considered one CEM Report. The format or style in which a source decides to submit the data to DEQ may vary.

Because there are so many different regulations that specify what CEM data is required to be recorded and submitted in a CEM Report, it is not practical to list them all. However, basic elements of CEM Reports are summarized below.

A. CEM Performance Data

1. The source operating time (i.e. the number of hours the emission unit being monitored was in operation during the quarter)
2. The monitored operating time (i.e. the number of hours the CEM was collecting valid data when the unit was in operation that quarter).
3. Date and times identifying specific periods during which CEM was inoperative
4. Explanation of CEM downtimes (i.e. the nature of system repairs or adjustments)
   OR
5. An affirmative statement of "No Period of Downtime, Repair, or Adjustment" if applicable

B. Excess Emissions Data (reported in units of the applicable standard)

1. The specific time periods during which emissions incidents occurred, including date and time of commencement and completion (i.e. the hours, or six-minute periods for opacity, or 30-day rolling average period, that emission limits were exceeded).
2. Duration of each emissions incident (i.e. a column summing up the total time between commencement and completion of each incident)
3. The magnitude of each excess emissions incident (i.e. the highest or worse case CEM reading during that incident)
4. Conversion factors used, if applicable
5. Identification and categorization of excess emissions caused by start-up, shutdown, maintenance, malfunction, other
6. Corrective actions taken or preventive measures implemented
   OR
7. An affirmative statement of "No Excess Emissions" during the reporting period, if applicable

C. Emissions Data (as applicable)

1. Some permits and regulations require the facility to submit all CEM results for the reporting period, even if they are in compliance with emission limits. Depending on the permit emission limit and its averaging period, the facility may be required to submit

[2] In 2000 EPA changed the reporting requirements of 9 VAC 5-80-110 F2a to read as follows: *Submittal of reports of any required monitoring at least every six months. All instances of deviations from permit requirements must be clearly identified in such reports. All required reports must be certified by a responsible official consistent with 9 VAC 5-80-80 G.*

CEM data in any of the following formats:

a. Hourly averages
b. Three-hour averages
c. Daily averages
d. Daily cumulative totals
e. Weekly averages
f. Weekly cumulative totals
g. Monthly averages
h. Monthly cumulative totals
i. Annual 12-month rolling averages calculated monthly
j. Any other averaging or time period as specified in the permit or regulation

D. Audit Results (as applicable)

1. Dates of quarterly quality assurance audits (CGA, RATA, or RAA) for gas monitors
2. Results of audits for gas monitors
3. Quality assurance measures or audits done on opacity CEMs, if required by permit or regulation (40 CFR 60, Appendix F, only covers quality assurance of gas monitors)

Included as attachments to this guidance document are worksheets that can be used by agency staff and regulated sources to assist in the preparation and review of CEM Reports. These attachments are:

ATTACHMENT A: CEM REPORT REVIEWER'S CHECKLIST
ATTACHMENT B: CEM SUMMARY DATA
ATTACHMENT C: SUMMARY OF SOURCE DOWNTIME
ATTACHMENT D: SUMMARY OF CEM DOWNTIME
ATTACHMENT E: SUMMARY OF EXCESS EMISSIONS

VI. CEM REPORT REVIEW PROCEDURES

A. Initially Screen the Report

Initially Screen the Report using the *EER Reviewer's Checklist* (see Attachment A). Evaluate the report for timeliness, completeness and the summary of excess emission and CEM performance data. This form may be modified to add additional required elements, depending upon the applicable regulation or permit.

Check the date of receipt or envelope postmark. NSPS sources are required to submit EERs postmarked by the 30th day after the end of each quarter. If a report is late, save the envelope in which the report was submitted to document that the source failed to comply with the timeliness requirement.

B. Research

Research the source's permit or the regulations to understand what CEMs are required for that facility and why. The reviewer must have a thorough understanding of why each monitor is at the facility (the underlying regulatory requirement), what unit and what emissions it is supposed to measure, and what data the source is required to submit. For example, a coal-fired steam generating

unit may be required by state regulations to have an opacity CEM, a federal NSPS may require an SO_2 monitor, and the federal Acid Rain and NOx Trading programs stipulate NOx CEMs that must meet both 40 CFR Parts 60 and 75 monitoring requirements.

Understand the monitoring systems and how they operate. Basic source identification information includes:

a. the type of source (e.g., electric utility, coal or oil fired);
b. location of the monitor (identification of unit and stack);
c. type of control equipment used (e.g., ESP, baghouse or scrubber);
d. applicable emission standards;
e. the type of monitor (brand, type of data recording system);
f. the operating principles of the monitor.

Note any unusual operating configuration. For example, a single monitor may record data for emissions from three different boilers that exhaust into one common stack. Problems with any of the three emissions units or their control equipment may be the cause of exceedances recorded by the monitor.

C. Review Summary Data

Review Summary Data regarding CEM performance and excess emissions.

1. If there are no periods of CEM Downtime or Excess Emissions, and the source conducted quarterly audits as required, simply verify that attached documentation supports this assertion. An inspector may wish to check CEM readings and maintenance records on site to verify that there was no monitor downtime during unit operation, and that there were no emissions incidents during that reporting period. Otherwise,

2. Determine whether or not the percent downtime and/or the percent excess emissions are within acceptable ranges. Some regulations specify a percent availability for the monitors (such as 75% or 90%). Other regulations, such as the NOx Trading Program regulations, do not specify a percent CEM availability requirement because conservative data substitution formulas are used to estimate emissions during monitor downtime.

   Regarding percent excess emissions, for direct compliance monitors, any monitored exceedance of an emission standard is technically a violation (see Section VII). However, the degree of enforcement response should be proportional to the significance of the exceedance. Some judgment must be used in determining when a follow-up site visit is necessary. For indirect compliance monitors, excess CEM downtime or emissions may be indicative of operation and maintenance (O&M) problems at the facility. See paragraphs VI and VII below for more discussion on follow-up procedures.

D. EvaluateTrends

Evaluate Trends in CEM and facility O&M practices by comparing the CEM Report summary data with previous reports. The source operating data and CEM performance data should be evaluated in order to determine the percentage of monitored operating time for which the unit was reporting exceedances. If the percent availability or emission incident percentage is

repeatedly approaching or exceeding permitted thresholds quarter after quarter, the regional office shall notify the source and follow-up action, as appropriate, shall be initiated.

E. Get into the Details

Even though the source usually summarizes the data for DEQ (see ATTACHMENT B), the inspector must verify the data by evaluating the supporting documentation in the CEM Report.

1. Calculate the total monitored source operating time. Determine the duration of source downtime using summary information provided by the source in the EER. Subtract the total source downtime from the total number of hours in that reporting period (8760 hrs/year, 4380 hrs/semiannual, 2190 hrs/quarter). Encourage the source to use ATTACHMENT C: SUMMARY OF SOURCE DOWNTIME for reporting these periods in a standard format. If the source was not operating for a significant portion of the quarter (e.g. a peaking power generation facility), the calculation of percent excess emissions and percent CEMS downtime may be inflated and should be evaluated accordingly when considering follow-up enforcement. Verify that your calculations match what the source reported on the summary sheet.

2. Calculate the total and percent CEM downtime. Determine the duration of CEM downtimes using information provided by the source in the EER. Do not include CEMS downtime, which is reported during source downtime (if source downtime information is available). If the EER does not provide adequate information to make this determination, assume that all reported CEM downtime occurred during periods of source operation. Times during which the CEM was "out of control" due to failed calibrations or audits is considered CEM downtime if it occurred during source operation.

The cause of the CEMS downtime or the nature of system repairs or adjustments should be identified (required for all NSPS sources). Each separate incident should be explained. An incident of CEM downtime is any uninterrupted period (of any time length) during which the CEM is not operating or providing accurate data.

Encourage the source to use ATTACHMENT C: SUMMARY OF CEM DOWNTIME for reporting these periods in a standard format. Verify that the number of hours for each reason category and the total hours match what the source reports in the summary sheet. If the reason codes differ from those used by EPA, the reviewer must correlate source reason codes to the EPA reason codes; encourage the facility to use the EPA reason codes for uniformity.

(a) Monitor Equipment Malfunctions
(b) Non-monitor CEM Equipment Malfunctions (e.g., computer, data recorder, etc.)
(c) Calibration/QA
(d) Other Known Causes
(e) Unknown Causes

Verify that the source divided by the "monitored source operating time" when calculating the percent CEM downtime.

3. Evaluate excess emissions.
   a. Reporting In Periods of the Applicable Standard -
      Opacity: Opacity data must be reported in percentages over six-minute time periods. If the source reports the number of six-minute periods for emission incidents, the inspector will have to convert to minutes and hours. For example, 10 six-minute periods equal one hour.
      Other Pollutants: If the permit limit is in terms of pounds per hour using two significant figures after the decimal, then the CEM data reported must be in the same units. Emission limits may be in terms of pounds/hr, tons/yr, pounds/million BTU, etc. The emission limit may be based on a rolling 12-month average, a 3-hour average, a one-hour average, etc. *If the emission limit is based on an averaging period of more than one hour, then caution must be exercised in interpreting the percent excess emissions summary, which is based on hourly readings.* If the source shows an emissions incident for two consecutive hours, but the emission standard is a three hour average, then technically the source is not out of compliance, even though the two hours will be reported on the summary tables.

   b. Magnitude - An evaluation of the magnitude of excess emissions is useful in later stages of the EER review to determine the severity of the impact on non-compliance and the appropriate response.

   c. Reporting of Malfunction Information - For some sources, such as those subject to NSPS, Subpart D, periods of excess emission which occur during (1) startup or shutdown of the plant or unit, or (2) malfunction of the process or control equipment must be separately identified. The nature and cause of the malfunction must also be specifically identified. It is not adequate just to state that an excess emission is caused by a malfunction. More specific information must be provided by the source. Any corrective actions or measures taken to prevent future malfunctions should also be described.

      DEQ regulations (9 VAC 5-20-180) require that facilities notify DEQ within four business hours of any malfunction that results in excess emissions lasting more than one hour, and follow up with a letter of explanation within two weeks of the incident. A planned shutdown or maintenance of control equipment must be reported to DEQ at least 24 hours prior to the incident.

      The reviewer should cross-reference any reported emissions incidents lasting more than one hour with regional office records to verify that every malfunction was reported as specified above by the facility. DEQ cannot accept the explanation of "Malfunction" for an unreported excess emissions incident. This impacts the level of enforcement response, should the situation warrant.

d. Calculate the total duration of all periods of excess emissions - using summary information or calculating directly from the report. Encourage the facility to use ATTACHMENT E: SUMMARY OF EXCESS EMISSIONS to record its incidents of excess emissions. The EPA reason codes should be used for uniformity:

(a) Start-up/Shutdown
(b) Control Equipment Problems
(c) Process Problems
(d) Fuel Problems
(e) Other Known Problems
(f) Unknown Causes

Remember to exclude any excess emissions that are caused by monitor problems. This information should be included as CEM downtime. Also exclude any excess emissions which occur during source downtime.

e. Evaluate the nature and cause of excess emissions incidents. The source should document the reason for each emissions incident and any corrective action taken. If there is no information provided regarding the cause of excess emissions, or if the reasons are inadequate or unclear, the report is unacceptable and follow-up with the source is necessary before we can make a compliance determination.

f. Calculate the total duration of excess emissions for each reason category. Record the total duration for each reason category and verify that the source summarized the totals on the summary tables correctly.

g. Calculate the percent excess emissions by dividing by the source monitored operating hours.

4. Review Audit Results in accordance with ASOP-4 and other federal and state guidelines. Ensure that the audit was performed on schedule and passed specifications.

F. Make a compliance determination

After the CEM Report is evaluated, the reviewer must make a compliance determination, documenting his or her findings in CEDS and generating an inspection report.

1. **IN COMPLIANCE**: The source is considered in compliance if the report contains the information necessary to determine compliance, is in an acceptable format, was received on time, quarterly audits were performed successfully, and CEM Downtime and Excess Emissions percentages are acceptable. For direct compliance monitors, the CEMs must

show continuous compliance with emission limits and meet monitor availability requirements.

2. **OUT OF COMPLIANCE**: The source is considered out of compliance if the report was late, did not contain enough data to determine compliance, was not complete, was not in the proper format, quarterly audits were not performed successfully, or there was excessive monitor downtime or violations of emission standards for direct compliance monitors. (See next section regarding enforcement actions).

3. **PENDING**: The source is marked with a compliance status of "pending" when additional minor information was requested to complete the review or a follow-up inspection is needed. In both cases, a final compliance status of "in" or "out" should be entered for this inspection within 30 to 60 days.

G. Generate an inspection report in CEDS

Once the CEM Report is reviewed, generate an inspection report in CEDS within 30 days of receipt of the CEM Report. (It is not necessary to enter multiple inspection reports for each CEM evaluated; one inspection report will suffice.) A copy of the final inspection report or a follow-up letter is usually sent to the source to notify them of the agency's findings.

H. Send data to Central Office for entry into the national EPA database

The reviewer forwards a copy of the inspection report along with the CEM Report summary pages, CEM REPORT REVIEWER'S CHECKLIST (see Attachment A) and, if applicable, the audit results to the Central Office Air Compliance Section for entry into the national EPA database. Information for the CEM Report(s) should be submitted to the Central Office Air Compliance Section within 60 days of receipt of the CEM Report in the regional office.

VII. CEM VIOLATION CATEGORIES

A. TYPES OF VIOLATIONS:

There are five principle categories of continuous monitoring-related violations. A brief description of each of these categories follows.

1. **Emission Standard Violation** - occurs whenever a pollutant emission rate, averaged over a specified time period, is documented by a direct compliance monitoring system to be in excess of an emission standard.

2. **Percentage Reduction Violation** - occurs whenever a monitoring system measures the efficiency of a control device (percent reduction of the emissions of a specified pollutant) as less than that required by a particular regulation, permit or order.

3. **Data Capture Violation** - occurs whenever a monitoring system is documented to have generated data for less than the number of hours or days and/or the specified percent availability required by a particular regulation, permit or order.

4. **Operation and Maintenance (O&M) Violation** - refers to a failure to demonstrate acceptable operating and maintenance practices, as documented by the CEM REPORT data, for the facility, including its control equipment, and/or the CEM system. 9 VAC 5-40-20, Paragraph E, and 9 VAC 5-50-20, Paragraph E, of the state air regulations state:

"At all times, including periods of startup, shutdown, soot blowing and malfunction, owners shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with air pollution control practices for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the board, which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source."

5. **Procedural and Reporting Violations** - encompass a wide variety of violations associated with the installation, certification, quality assurance, recordkeeping and/or reporting requirements specified by regulation, permit or order.

B. HIGH PRIORITY VIOLATIONS

EPA's High Priority Violator (HPV) Policy specifies criteria for determining when CEM results showing noncompliance are significant enough to be classified as High Priority Violations. The HPV criteria are consulted when dealing with a CEM that monitors a pollutant for which the source is major. This can include an opacity CEM at a facility, which is major for particulate.

1. **HPV General Criterion 7**: Violations that involve testing, monitoring, recordkeeping, or reporting that substantially interfere with enforcement or determining the source's compliance with applicable emission limits.

2. **HPV Matrix Criterion 3**: Violation of parameter limits where parameter is a direct surrogate for an emissions limitation detected by continuous/periodic parameter monitoring.
   a) If the applicable standard is exceeded for more than 50% of the operating time during the reporting period or more than 25% of the operating time for each of two consecutive reporting periods, the violation is an HPV regardless of magnitude.
   b) If the applicable standard is exceeded for more than 3% of the operating time during the reporting period AND the magnitude is greater than 5% in excess of the applicable limit, the violation is an HPV.

3. **HPV Matrix Criterion 4:** Exceedance of applicable non-opacity standard detected by CEMS.
   a) Any violation of a standard for which the averaging period is more than 24 hours is an automatic HPV.
   b) For other standards in which the averaging period is less than or equal to 24 hours:

      1) if the applicable standard is exceeded for more than 50% of the operating time during

the reporting period, or for more than 25% of the time for two consecutive reporting periods, regardless of magnitude, it is an HPV; or

2) if the standard is exceeded for more than 5% of the operating time during the reporting period, or more than 3% for two consecutive reporting periods, and the violation is at least 15% in excess of the applicable limit, or is over the limit plus the SST (see definition of SST), then it is an HPV.

4. **HPV Matrix Criterion 5:** Exceedance of applicable opacity standard (detected by COMS or by VEE)

   a) For violations detected by COMs, if the opacity standard is exceeded for more than 5% of the operating time during the reporting period or 3% for two consecutive reporting periods and if opacity is more than 5% over the limit, it is an HPV.

For violations detected by VEE, if the magnitude is >50% of the opacity standard, it is an HPV. For a 20% opacity limit, a violation of 30% opacity would be an HPV.

C. INFORMAL VERSUS FORMAL ENFORCEMENT

When sources with direct compliance monitors show exceedances of emission limits, or whose CEMs do not meet required performance or quality assurance criteria, evidence indicates that a violation has occurred. However, minor deviations can be handled through informal enforcement (at the region's discretion).

1. The Inspection Report

The first step in documenting noncompliance is in the "Results" field of the CEDS inspection report for the review of the CEM Report. The report should indicate an inspection result code of "Out of Compliance".

2. Informal Enforcement

Examples of minor deviations which can be handled using informal enforcement are:

a) reports submitted less than 30 days late
b) CEM readings or QA/QC results only a small percentage off for a short period of time (the HPV criteria above can be used as a model even for non-major sources in determining whether or not exceedances should be considered "significant")
c) Minor excess opacity during startup of a boiler
d) Periodic spikes of pollutant emissions during maintenance of combustion units or control equipment

If periods of startup, shutdown, or maintenance appear to be too extended or too frequent, an investigation of operating and maintenance practices may be in order. Even minor deviations, if they continue quarter after quarter, may warrant a more formal enforcement response.

Informal enforcement involves addressing the matter with the facility verbally and documenting

the conversation in an inspection report, or by issuing a Request for Corrective Action, Informal Correction Letter, or a Warning Letter (see Chapter 2 of the DEQ Enforcement Manual).

3. Formal Enforcement

If a violation at a major source (i.e. concerning a pollutant for which the source is major) triggers HPV status, a Notice of Violation shall be issued and the source designated as an HPV.

Formal enforcement can be pursued for non-HPV violations that the region deems are significant, using the HPV criteria above as a model and referring to the DEQ Enforcement Manual for guidance.

Formal enforcement involves the issuance of a Notice of Violation, usually followed by a Consent Order assessing civil charges.

4. CEDS Enforcement Tracking

DEQ air compliance staff shall track enforcement cases in CEDS according to the DEQ CEDS Manual and the DEQ Enforcement Manual. Enforcement actions and events should be entered within 15 days of the occurrence of each event.

ATTACHMENT A: CEM REPORT REVIEWER'S CHECKLIST

Inspector's Name: _____ Date: _____

Central Office Contact: _____ Date Info. Sent to CO: _____

1. Company: _____

   Plant/Unit: _____

   Pollutant(s): _____ Quarter: _____

2. Timeliness (Must be postmarked within 30 days of end of quarter)

   (a) Date Postmarked: _____ (b) Days Late: _____

3. Completeness (For CEM REPORTS which cover multiple monitors, specify monitor when noting problem)

CEM Performance Information	No Problem	Problem (Describe/Comments)
Source Operating Time		
CEM PERFORMANCE INFORMATION		
(a) Affirmative Statement of No Period of Downtime, Repair or Adjustment (include no CEM modifications)		
(b) Date and Time of Specific Periods During Which CEM Was Inoperative		
(c) Nature of System Repairs or Adjustments		
EXCESS EMISSIONS (EEs) INFORMATION		
(a) Affirmative Statement of No EEs		
(b) Data Reported in Units of Applicable Standards		
(c) Date and Time of Commencement		
(d) Date and Time of Completion		
(e) Magnitude		
(f) Conversion Factors Used		
(g) Identification of EEs Caused by Start-up, Shutdown, or Malfunction		
(h) Nature and Cause of Malfunction		
(i) Malfunction Corrective Action or Preventive Measures		

ATTACHMENT B: CEM SUMMARY DATA

(Use Separate Forms for Each Monitor)

Type of Pollutant: _____

(a) CEM Performance (Includes Aggregate Downtime for Pollutant and Diluent Monitors)

Causes of CEM Downtime**	Total Downtime (hours)	% Unavailabile[2]	Comments
(a) Monitor Equipment Malfunctions		%	
(b) Non-monitor CEM Equipment Malfunctions (e.g., computer, data recorder, etc.)		%	
(c) Calibration/QA		%	
(d) Other Known Causes		%	
(e) Unknown Causes		%	
(f) Total		%	

[2] Percent unavailability is calculated by the following formulas:

where:

CEM Downtime[4] During Source Operating Time (hours) / Source Operating Time (hours) x 100 = Percent Unavailability

Time in Quarter (hours) - Source Downtime (hours) = Source Operating Time (hours)

(b) Emissions Performance

Causes of Excess Emissions**	Total Duration of EE's (hours)	Percent of Monitored Operating Time[3]	Comments
(a) Start-up/Shutdown		%	
(b) Control Equipment Problems		%	
(c) Process Problems		%	
(d) Fuel Problems		%	
(e) Other Known Problems		%	
(f) Unknown Causes		%	
(g) Total		%	

[3] Percent of Monitored Operating Time is calculated by dividing the total hours of exceedances by the time in which both the source and monitor have been operating during the quarter, then converting the result to a percentage:

Total Duration of Excess Emissions (hours) / Monitored Operating Time (hours) x 100 = Percent of Monitored Operating Time (hours)

where:
Time in quarter (hrs) - Source Downtime (hrs) - CEM Downtime[4] During Source Operating Time (hrs) = Monitored Operating Time (hrs)

[4] Assume all reported CEM downtime occurs during periods of source operation unless explicitly stated.

** Proposed definitions for these categories appear in Technical Guidance on the Review and Use of Excess Emission Reports.

ATTACHMENT C: SUMMARY OF SOURCE DOWNTIME

Company: _____

Unit: _____ Quarter: _____

Incident Number	Start Month/Day/Time	Stop Month/Day/Time	Duration (hours)	Reason

TOTAL SOURCE DOWNTIME: _____ (hours)

ATTACHMENT D: SUMMARY OF CEM DOWNTIME

Company: _____

Unit: _____ Quarter: _____

Incident Number	Start Month/Day/Time	Stop Month/Day/Time	Duration (hours)	Reason/ Corrective Action	Reason Code

TOTAL CEM DOWNTIME: _____ hours

REASON CODES:
a = Monitor equipment malfunction
b = Non-monitor equipment malfunction
c = Calibration/QA
d = Other known causes
e = Unknown causes

ATTACHMENT E: SUMMARY OF EXCESS EMISSIONS

Company: _____

Unit: _____ Quarter: _____

Pollutant: _____

Incident Number	Start Month/Day/Time	Stop Month/Day/Time	Duration (hours)	Reason/ Corrective Action	Reason Code

TOTAL EXCESS EMISSIONS: _____ hours

Reason Codes
a = Startup/shutdown
b = Control Equipment Failures
c = Process Problems
d = Fuel Problems
e = Other Known Problems (include soot blowing here)
f = Unknown Problems